

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re: patent application of:)
ERB, Wilfried, et al) Examiner: Unknown
NONWOVEN MAT, METHOD FOR)
PRODUCTION THEREOF AND) Group Art Unit: Unknown
FIBRE COMPOSITE)
U.S. Serial No.: Unknown) Confirmation No.: Unknown
(PCT/EP2004/003470)) Atty. Case No. 12944/003
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AMENDED CLAIMS FILED UNDER RULE 19

Amended Claims

1. Nonwoven mat as half-stuff which contains at least one first fibre made of a thermoplastic with a fibre length of 0.1 – 30 mm, having a weight proportion of 30 to 90%, and at least one second reinforcing fibre with a fibre length of 0.1 – 30 mm, the temperature stability of which is greater than that of the first fibre, having a weight proportion of 10 to 70%, the first fibre and the at least one reinforcing fibre being bonded with 1 to 10 per cent by weight of a binder at the intersection points or contact points merely, the weight proportions being relative to the entire formulation of the nonwoven mat, with the proviso that the fibre length of the first fibre is smaller than that of the reinforcing fibre, and in that the nonwoven mat has a basis weight of 8 to 400 g/m².
2. Nonwoven mat according to claim 1,
characterised in that the length of the first fibre is 2 mm to 6 mm.
3. Nonwoven mat according to claim 2,
characterised in that the length of the first fibre is 2.5 mm to 3.5 mm.
4. Nonwoven mat according to claim 1,
characterised in that the length of the reinforcing fibre is 6 mm to 18 mm.
5. Nonwoven mat according to claim 4,
characterised in that the length of the reinforcing fibre is 6 mm to 12 mm.
6. Nonwoven mat according to one of the claims 1 to 5,

characterised in that the first fibre is selected from polyether etherketone, poly-p-phenylene sulphide, polyether imide and/or polyether sulphone and/or mixtures thereof.

7. Nonwoven mat according to one of the claims 1 to 6, characterised in that the reinforcing fibre is selected from glass fibres, aramide fibres, carbon fibres, ceramic fibres, metal fibres, polyimide fibres, polybenzoxazole fibres and natural fibres and/or mixtures thereof.
8. Nonwoven mat according to one of the claims 1 to 7, characterised in that the binder is selected from compounds which are constructed based on polyacrylate, polyvinyl acetate, polyvinyl alcohol, polyurethane, resins, polyolefins, aromatic polyamides or copolymers thereof or mixtures thereof.
9. Nonwoven mat according to claim 8, characterised in that the binder is selected from filaments, fibrils and/or fibrous binders and the geometry varies with respect to the length/width/height ratio for each individual parameter in the ratio relative to each other in the range of 1 : 1 to 1 : 100,000.
10. Nonwoven mat according to one of the claims 1 to 9, characterised in that it contains additives in addition.
11. Nonwoven mat according to claim 10, characterised in that the additives are selected from tribological additives, additives made from fibres, filaments, fibrils, pulps, metallic or ceramic powder or organic powder and/or mixtures thereof.

12. Nonwoven mat according to claim 11,
characterised in that PTFE fibres or powder, PI fibres, aramide
fibres, carbon fibres or powder and/or metal powder are used as
additives.
13. Nonwoven mat according to at least one of the claims 1 to 12,
characterised in that the nonwoven mat has a density of 30 to 500
kg/m³.
14. Nonwoven mat according to one of the claims 1 to 13,
characterised in that it has a thickness of 0.1 mm to 4 mm.
15. Nonwoven mat according to at least one of the claims 1 to 14,
characterised in that a flat substrate is applied on at least one outer
side of the nonwoven mat.
16. Nonwoven mat according to claim 15,
characterised in that a web-shaped structure in the form of a woven
fabric, plaited fabric, paper or nonwoven is applied.
17. Nonwoven mat according to at least one of the claims 1 to 16,
characterised in that it is a composite of at least two nonwoven
mats.
18. Nonwoven mat according to one of the claims 1 to 17,
characterised in that the first fibre and the reinforcing fibre are
present homogeneously distributed in the mat.
19. Nonwoven mat according to at least one of the claims 1 to 18,
characterised in that the first fibre and the reinforcing fibres are
present inhomogeneously distributed in the mat.

20. Method for producing a nonwoven mat according to at least one of the claims 1 to 19,
characterised in that the first fibre and the reinforcing fibre are dispersed in a dispersion agent, preferably water, and in that a continuous nonwoven formation is effected on a diagonally running wire belt by filtration and subsequently compaction and drying of the nonwoven web is implemented, the binder being added during the dispersion step and/or during the nonwoven formation.
21. Method according to claim 20,
characterised in that the binder is added in the form of fibres in a dispersion.
22. Method according to at least one of the claims 20 or 21,
characterised in that the additives are introduced in the form of fibres or powders.
23. Method according to claim 22,
characterised in that the additives are introduced or sprinkled on during the dispersion step and/or during the nonwoven formation.
24. Method according to at least one of the claims 20 to 23,
characterised in that the basis weight and the thickness of the nonwoven is controlled by the material composition of the dispersion and/or the supply speed of the dispersion towards the diagonal wire and/or the transport speed thereof.
25. Method according to at least one of the claims 20 to 24,
characterised in that the nonwoven formation is effected with sheet material placed on the diagonal wire.

26. Method according to claim 25,
characterised in that a plaited fabric, woven fabric or a nonwoven is used as sheet material.
27. Fibre composite produced from a nonwoven mat according to claim 1,
characterised in that it contains 30% to 90% by weight of a reinforcing fibre with a fibre length of 0.1 mm to 30 mm, and in that the reinforcing fibre is orientated anisotropically in the matrix of the material, the material having a density of 0.25 g/cm³ to 6 g/cm³.
28. Fibre composite according to claim 27,
characterised in that the reinforcing fibre is selected from glass fibres, aramide fibres, carbon fibres, ceramic fibres or mixtures thereof.
29. Fibre composite according to claim 27 or 28,
characterised in that the matrix comprises a thermoplast, selected from polyether etherketone, poly-p-phenylene sulphide, polyether imide and/or polyether sulphone.
30. Fibre composite according to claim 27,
characterised in that the density of the fibre composite is 30 to 100% of the maximum achievable density, which is calculated from the densities of the matrix material and of the reinforcing fibre.
31. Fibre composite according to one of the claims 27 to 30,
characterised in that the fibre composite has a functional layer on at least one side of the material.

32. Fibre composite according to one of the claims 27 to 31, characterised in that it has a thickness of 0.01 mm to 1.6 mm.
33. Fibre composite according to one of the claims 27 to 32, which can be produced by compaction of at least two nonwoven mats in a heated tool according to at least one of the claims 1 to 20.
34. Fibre composite according to claim 33, characterised in that the compaction was produced at a pressure of 0.05 – 15 N/mm².